Wireless Remotely Controlled Electronic Equipment and the Connecting Devices for the Same

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention relates to wireless remotely controlled electronic equipment and the connecting devices for the same. In particular, it is an electronic equipment with associated connecting devices in case the receiver unit of this equipment receives wireless command signals from an external transmitter when the equipment is energized by a power source, a function controller contained in this equipment is able to start to perform predetermined single or a variety of functional operations and output the resultant command signals to the connected light loads so as to cause the connected light loads to exhibit a variety of predetermined blinking effects.

DESCRIPTION OF THE PRIOR ART

As the blinking light strings may serve twinkling star-like effect in the night time, they are the favorable decorative lighting equipment where the accent lighting atmosphere is particularly desirous such as in festivals or for commercial advertisements. In consideration of electrical security, the connected light string loads to a power source should be proper in amount so as to avoid overheat or even burn down of conductors due to insufficient current carrying capacity. In the early years, in order to palliate the danger of

overloading, the light strings connected in series were arranged to be energized section by section resulting in failing to exhibit an unanimous twinkling effect of all light strings thereby seriously degrading the rejoicing atmosphere. For a remedy, it was tried to use larger sized conductors or increase the capacity of the controller so as to allow increasing the number of the light strings connected in one circuit. But soon it was found that the installation cost was too high, moreover, all light strings became dark in occurrence of a failure of broken conductor, and worse to worst, it had to accompany a costy repairing work.

A fairly progressive solution was disclosed by US Pat. No. 5854541 in which a controller is provided to a string of lights, the controller input terminal is connected to an external power source. The output terminal of a trigger circuit included in the çontroller is connected to the aforesaid light string, one terminal of the trigger circuit is reserved for catching the incoming oscillation command signals for ON/OFF control of the trigger circuit such that the lights on the light string are caused to blink according to the incoming command signals. A plurality of identical unit light string connected in parallel with each other are then connected to the trigger circuit of the controller. With this structure, all lights in this system can blink simultaneously without need for bigger-sized conductors to prevent overloading.

However, the light strings constructed as such are not easy to distribute the light strings over a broad area because it is necessary to connect unit light string one by one in parallel with each other which restricts extendable length

of the circuit. Besides, the way of diode rectification which turns on the light loads during either positive or negative half wave can only cause a monotonous blinking effect, but cannot provide more variable and vivid twinkling effect. Furthermore, if the layout of the light strings is intended to extend widely, it has to depend on an inconvenient pilot wire.

SUMMARY OF THE INVENTION

Aiming at the above depicted shortcoming inherent to the prior arts, the present inventor has delved in this matter for a long time efforts and finally succeeded in realizing this invention.

It is an object of the present invention to provide an electronic equipment and its associated connecting devices which can be remotely controlled by wireless command signals so as to obtain a variety of blinking effects from the connected light strings.

It is another object of the present invention to include a function controller and a receiver unit which can be separately installed or integrally installed together without affecting variability of blinking effects of the connected light strings.

To achieve the above mentioned objects, the present invention comprises an insulation box to accommodate the electronic equipment therein and protect

its electrical security; several connecting devices for interconnecting power supply and light load; a receiver unit for receiving wireless command signals from an external transmitter; and a function controller for performing a variety of functions according to the received wireless command signals. With this scheme, when the present invention is energized by an input from the power source, the wireless command signals received by the receiver unit are transmitted to the function controller so that the function controller is actuated to perform predetermined single or a variety of functional operations and output the resultant command signals to the connected light load so as to cause the connected light load to display a variety of blinking effects.

To enable a further understanding of the innovative and technological content of the invention herein, refer to the detailed description of the invention and the accompanying brief description of the drawings appended below.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a cross-sectional view of the present invention;

Fig. 2 is the circuit diagram of the present invention;

Fig. 3 is a view illustrating a second embodiment of the present invention;

Fig. 4 is a view illustrating a third embodiment of the present invention;

Fig. 5 is a view illustrating a fourth embodiment of the present invention;

Fig. 6 is a view illustrating a fifth embodiment of the present invention;

Fig. 7 is a view illustrating a sixth embodiment of the present invention;

Fig. 8 is a view illustrating a seventh embodiment of the present invention;

Fig. 9 is a view illustrating an eighth embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIEMNTS

Referring to Fig. 1, the cross sectional view of the present invention, in which it is shown that the present invention comprises an insulation box 1, a receiver unit 2, a function controller 3, and one or more than 1 connecting devices 4.

The insulation box 1 provides electrical security with its insulated framework 11 for the electronic equipment from an input side to an output side.

The receiver unit 2 is accommodated in the insulation box 1 for receiving incoming wireless command signals transmitted from outside.

The function controller 3 also accommodated in the insulation box 1, is connected with the receiver unit 2 for performing a variety of functions according to the wireless command signals received by the receiver unit.

The connecting device 4 is formed of a group of electric conductors which are extended out of the insulation box 1 to connect to a power supply with an AC electric plug 41, and to connect to the electronic equipment accommodated in the insulation box 1 and a plurality of light string loads 42 connected in series, parallel, or series-parallel.

Referring to Fig. 2, a schematic diagram for the circuit of the present invention the receiver unit 2 is essentially composed of an IC unit 21 and some of the auxiliary electronic component. The IC unit obtains the power supply from an AC power source and receives incoming wireless command signals and transfer the same to the function controller 3. The receivable wireless command signals include: infrared ray waves and microwaves, and their intensity, quantity and quality are adjustable, changeable, controllable and switchable.

The function controller 3 shares the use of the IC unit 21 with the receiver unit 2, and has auxiliary components 31 in addition. The auxiliary components 31 include a rectifier 311, a capacitor 312, a voltage stablorizing diode 313, a SCR 314, and a switch 315 so as to perform variation, adjustments, staborizing promotion, initiation, and protection of the equipment.

The function controller 3 also has a synchronous control circuit 32 which is composed of a quartz oscillator 321 a capacitor 322, and a resistor 23, and is connected with the IC unit 21 to form an oscillator circuit for providing a reference frequency for the equipment to operate according to a predetermined function.

It is not an important matter whether the IC unit has a memory ability or not, but it is absolutely necessary that all the light strings keep pace with one another in operation as soon as they are energized from a similar AC power source and receive the same command signals from the same signal transmission line so that their AC waveforms are rectified into an identical DC with a specific waveform and frequency and is inputted into the IC unit 21 as a reference value of waveform and frequency. This reference value is used to modify and adjust the deviation arising from the difference of characteristics between the quartz oscillator 321 and associated auxiliary component during the chopped time interval of the trigger circuit. In this way, the unanimous blinking effect for all light strings can be achieved through transmitting the control signals from the IC unit 21 widely to all directions without requiring extra pilot wires.

The sequence of operation can be clearly observed on Fig. 2, the equipment is energized by inserting the AC plug 41 to the power source, the receiver unit receives incoming signals and then causes the function controller 3 to start performing the predetermined either a single, or a variety of functional operations such that the resultant output of the function controller 3

makes the connected light string loads to display a variety of predetermined blinking effects.

In the second embodiment shown in Fig. 3, an insulation box 1a is encircled by a standing wall, a couple of blade insertion holes 11a are provided on the front wall for insertion of a couple of connecting blades 5a an 6a. On the other hand, a via hole 12a is provided through the rear wall for introducing a two core insulated conductor 13a having two terminals 14a, 15a to enter the insulator box 1a. The inner cavity of the insulation box 1a is parted with several pieces of barrier 16a into a plurality of isolated chambers for accommodating receiver and control units. A receiver and control unit 2a has a signal receiving section 3a with a fusing device 4a provided at one side thereof for protecting overcurrent of circuit within a preset limit of the safety current. The fusing device 4a contacts a contact portion 21a of the receiver and control unit 2a via a reserver hole on its housing. Another contact portion of the receiver and control unit 2a is connected with the terminal 14a of the two core insulated conductor 13a. The tails of the above mentioned connecting blades 5a and 6a are biforked for inlaying and fixing the barrier 16a thereat. One of the prong of the biforked blade 5a is in connection with the terminal 15a, while one prong of the other blade 6a is in contact with the fusing device 4a. Meanwhile, the number of insulated conductors depend on the necessary input and output electrical circuits.

Referring to Fig. 4, in the third embodiment of the present invention, a couple of blade holes 11b is provided on the front wall of an insulation box 1b,

while on the rear wall thereof a couple of insertion holes 12b are provided for blades leading to the load to insert. The inner cavity of the insulation box 1b is sectioned by several barriers 13b for accommodation of a plurality of function controllers 21b, 22b, 23b having similar or different function control ability. One of them, i.e. 23b is connected to a receiver unit 3b. The waist portions of the insertion blades 12b are rested on and fixed to the front wall of the insulation box 1b. The tips of the blades are emerged out of the front wall to connect the power source, while the rear connector blades are contained in the insulation box 1b. One of the blades has a breached tail to trammel one of the barriers 13b, and is further in connection with the function controller 21b. The other blade is connected with the load terminal near the exit of the blade hole 11b. The connection blades are the electric connectors with their waist portions served as contact portions to electrically in contact with the equipment.

An interconnection blade 41b is interposed separately between rear load connector blade and front source blade. The interconnection blades 41b has a contact portion to contact the contact portion of the receiver unit or the function controller. The interconnection blade 41b is bent into a proper configuration to mate the blades 5b. There is a fusing device 6b in connection with the function controller 23b.

Referring to Fig. 5, in the fourth embodiment of the present invention, it is different from the third embodiment shown in Fig. 4 in that a synthetic function controller 2C is employed instead of the individual one used in the former embodiment, and a receiver 3C is installed at one side of the synthetic function

controller 2C, whereas both are entrained on a PCB.

Referring to Fig. 6, in the fifth embodiment of the present invention, several receptable holes 2d are provided at the contact portion of the receiver unit or the function controller, the receptable holes 2d are aligned to preserved corresponding holes provided on the insulation box for inserting connector pins 4d for supplying power to load. Besides, another receptable hole 2e is provided at the contact portion of the fusing device so as to accept insertion of another connector pin 4e serving as another pole terminal.

In the connecting devices of the present invention, the holes provided on the rear wall of the output sides thereof, and connector blades provided inside allow mutually mating connecting devices of similar function for performing a variety of functional operations, or allow mating connecting devices of different function for performing furthermore functional operations. Meanwhile, above mentioned holes and inner connector blades allow mating plugs for load connection.

In the sixth embodiment of the present invention shown in Fig. 7, discrimination means for refusing mating of incompatible connecting devices is provided in the form of tenon and mortise joint. As shown in Fig. 7, at both sides of a couple of blades 41e for an AC plug are accompanied with several stub tenons 42e and several slot mortises 43e each interposed between two adjacent stub tenons 42e. The stub tenon 42e is formed of an electrically insulation material and extended parallel to moving direction of the plug should

the tenon (51e) and mortise (52e) joint provided for another connecting device be completely coincident with the former tenon (42e) and mortise (43e) joint in size, position, and number, the two connecting devices are compatible and entitled to mate with each other. Otherwise, any two connecting devices which cannot fulfill the aforesaid condition will be considered incompatible and refused to mate with each other.

In the seventh embodiment of the present invention shown in Fig. 8, an inner entrainer 1f with several barriers 2f is provided in the insulation box 1, the barriers 2f divide the inner cavity of box 1 into several isolated chambers for setting component devices such as fixed blades 3f, a receiver unit and function controller 6f and a fusing device 7f. An upper opendable slide lid 5f is provided, which is appropriately formed to match the position of blade holes and the component devices entrained on the entraier 1f so as to facilitate replacement of the component parts 6f and 7f by opening the lid 5f.

The receiver unit and function controller and associated component parts can be separately assembled on an individual PCB, or assembled on the same PCB in combining form. It may as well reserve a contact portion on PCB for connection of other devices. The receiver unit and the function controller may individually be packed with an insulation material, or incorporatively packed in one unit. The insulated package shall reserve an exposed contact portion for connection of other connecting devices. The receiver unit and the function controller are detachably installed in the insulation box for replacement. The signal receiving portion of the receiver unit is emerged out of the insulation box

via the reserved hole so as to receive the command signals easily. The receiver unit and the function controller may be integrally combined in one piece.

Referring to Fig. 9, in this eighth embodiment of the present invention, the receiver unit can receive those command signals from various existing wireless transmitter sources such as a computer, a wireless mouse, a wireless key board, a wireless internet, and its distributed terminals, a wireless internet card, a cellular phone, and the receiver unit has an encoder and a decoder.

Those who are skilled in the art will readily perceive how to modify the invention. Therefore, the appended claims are to be construed to cover all equivalent structures which fall within the true scope an spirit of the invention.